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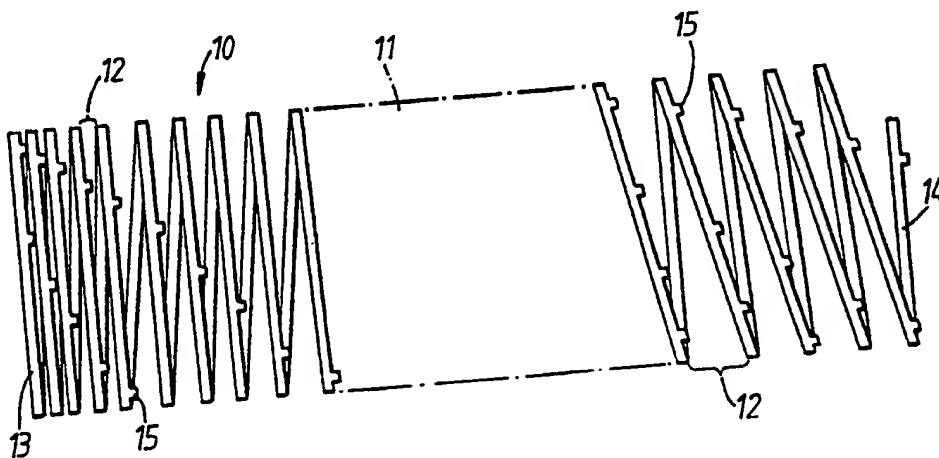
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(54) Title: **A FILTER ELEMENT**



(57) Abstract

A filter element generally indicated at (10) comprising a spring (11) whose coils are so formed that the filter gaps (12) progressively increase in size from one end (13) of the coil to the other end (14). The increase in the size of the gaps is carefully chosen so that the available deflection for any coil section, when the spring is vertically orientated, is sufficient to develop an upward force which can support the coils in the spring (11) which extend above that particular coil section. Similar results can be achieved by varying the resilience or stiffness characteristics through the filter element.

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A Filter Element

This invention relates to filter elements.

There have been a number of proposals over the years for filter elements configured as springs. One of the attractions of such elements is that they
5 can be extended on backwash to allow an increase in the filter gaps and hence easy release of trapped material. Such elements work extremely well when disposed with their longitudinal axis generally horizontal, but problems arise when it is desirable
10 to use the springs in a generally vertical orientation, because the weight of the upper part of the spring tends to prevent the lower part of the spring opening.

It is not possible to overcome this
15 problem simply by making the spring stiffer, because then it will not readily close to and maintain design filter gaps during normal flow.

The present invention consists in a filter element comprising a spring defining filter
20 gaps between adjacent coil sections, the spacing between the coil sections increasing progressively, when viewed not under load, from one end to the other such that when the spring is orientated vertically with the one end above the other the spacing between

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any pair of adjacent coil sections is sufficient to allow that part of the spring to support the weight of the coils above.

Thus put another way the invention consists in a spring being so manufactured that each coil can support the coils above it. From a manufacturing point of view clearly the spacing arrangement set out above is the most easily achieved, but the invention includes, for example, manufacturing different sections of the filter element from materials with different stiffness and resilience characteristics.

In a preferred form of the invention the spacing between any pair of adjacent coils is such that the pair of coils develops an overall upward force on the coils above. This force arises because the spacing determines the degree of deflection of the coil sections which can occur before it locks up on the coil sections below and the extent of deflection determines the upward force.

When the spring is arranged vertically the gaps between the coil sections are preferably substantially equal along a length of the spring and the coil sections preferably have longitudinally directed projections for defining a minimum gap.

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Although the invention has been defined above it is to be understood that it includes any inventive combination of the features set out above or in the following description.

5 The invention may be performed in various ways and a specific embodiment will now be described, by way of example, with reference to the accompanying drawings, in which:-

10 Figure 1 is a side view of a spring in a horizontal orientation;

 Figure 2 is an end view of the spring; and

 Figure 3 is a detailed cross-section of one side of the filter element in a vertical orientation.

15 Thus in Figure 1 a filter element generally indicated at 10 comprises a spring 11 whose coils are so formed that the filter gaps 12 progressively increase in size from one end 13 of the coil to the other end 14. The increase in the size of the gaps
20 is carefully chosen so that the available deflection for any coil section, when the spring is vertically orientated, is sufficient to develop an upward force which can support the coils in the spring 11 which extend above that particular coil section. Ideally
25 each coil section develops just over the necessary

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force so that the spring is "lively".

With a careful selection of spacing the filter element 10 can be constructed so that when arranged vertically the gaps 12 are substantially equal along the length of the spring 11; the minimum
5 gap being defined by projections 15.

When the filter element 10 is extended on backwash the spring 11 will open substantially equally along its length, because the construction
10 of the spring overcomes the effect of the coil weight.

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CLAIMS

1. A filter element comprising a spring configured such that, when orientated vertically in at least one sense, each coil in the spring can support the coils above it.
- 5 2. An element as claimed in Claim 1, wherein the stiffness and/or resilience of the coils changes progressively along the length of the coil.
3. An element as claimed in Claim 1 or Claim 2 wherein the spacing between the coil when not under load
10 changes progressively along the length of the coil.
4. A filter element comprising a spring defining filter gaps between adjacent coil sections, the spacing between the coil sections increasing progressively, when viewed not under load, from one end to the other such that
15 when the spring is orientated vertically with one end above the other the spacing between any pair of adjacent coil sections is sufficient to allow that part of the spring to support the weight of the coils above.
5. An element as claimed in any one of the
20 preceding claims, wherein any coil or coil section develops an overall upward force on the coils above.
6. An element as claimed in any one of the preceding claims, wherein the gaps between the coils or coil section are substantially equal along the length of
25 the spring, when the spring is arranged vertically.

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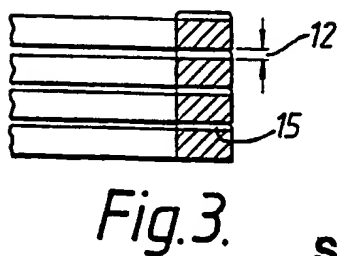
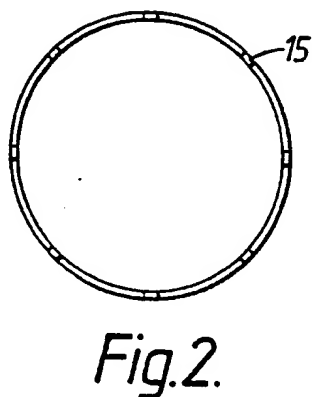
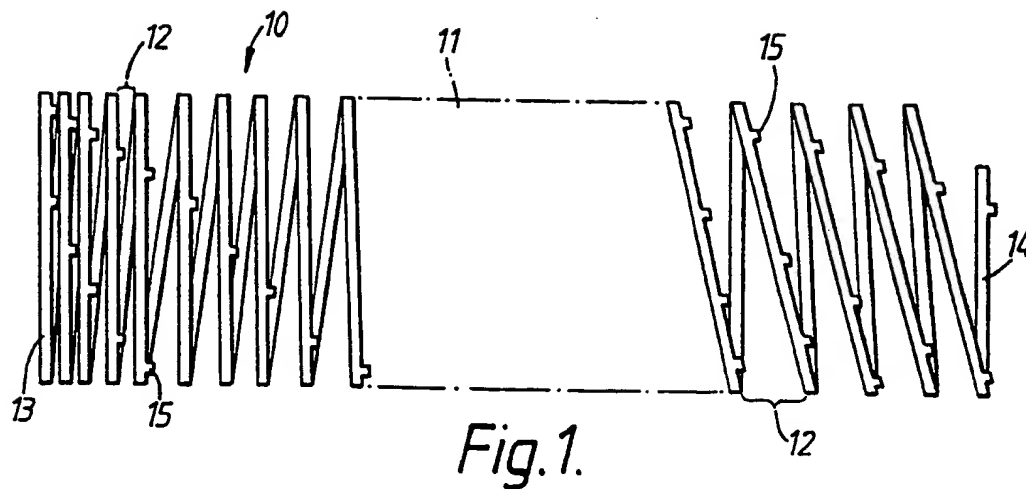
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7. An element as claimed in any one of the preceding claims, wherein the coil sections have longitudinally directed projections for defining a minimum gap.

8. A filter element substantially as hereinbefore
5 described with reference to the accompanying drawings.

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INTERNATIONAL SEARCH REPORT

PCT/GB 90/01274

International Application No

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁵ : B 01 D 29/48, B 01 D 29/11		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System ¹	Classification Symbols	
IPC ⁵	B 01 D 29/	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	EP, A, 0262398 (BOLL & KIRCH FILTERBAU) 6 April 1988 see column 6, lines 29-47; columns 6-15 ---	1, 5, 6, 7
A	GB, A, 556012 (SCOTT MOTORS) 16 September 1943 see pages 1-3 ---	1-8
A	FR, A, 919340 (R.E. SAINT-ANDRE) 5 March 1947 see pages 1-3 -----	1-8
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
26th November 1990	18. 12. 90	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	 Maria Weinberg	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9001274
SA 39688

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 07/12/90. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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EP-A- 0262398	06-04-88	DE-A- 3631399	17-03-88
		JP-A- 63077509	07-04-88
		US-A- 4804481	14-02-89

GB-A- 556012		None	

FR-A- 919340		None	
